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A SIMULATION MODELING APPROACH TO UNDERSTANDING INFORMATION TECHNOLOGY VALUE COCREATION

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Abstract:

The business value of information technology (IT) is increasingly being cocreated by multiple parties, opening opportunities for new research initiatives. Previous studies on IT value cocreation mainly focus on analyzing sources of cocreated IT value, yet inadequately accommodating the influence of competition relationships in IT value cocreation activities. To fill the gap, this in-progress paper suggests an agent-based modeling (also simulation) approach to investigating potential influences of the dynamic interplay between cooperation and competition relationships in IT value cocreation settings. In particular, the research proposes a high-level conceptual framework to position general IT value cocreation processes. A relational network view is offered, aiming at decomposing and systemizing several typical cooperation and competition scenarios in practical IT value cocreation settings. The application of a simulation approach to analytical insights and to theory building is illustrated.

Keywords: Business Value of IT, Value Cocreation, Relational Value, Resource-Based View of Firm, Agent-Based Modeling, Simulation Method.

1 INTRODUCTION

The information technology (IT) expenditure comprises a substantial portion of firms' investment budget (Rai et al. 1997; Gable et al. 2008). It is thus invaluable for firms to better understand the business value of IT and thereby to better determine where potential IT investment lies (Hitt et al. 2002; Davern & Kauffman 2000; Gable et al. 2008; Kohli & Devaraj 2003). In light of this, much previous research analyzes sources of IT value internal to a firm, such as IT resources owned by a firm in creating competitive advantage (Sambamurthy et al. 2003; Rai & Tang 2010; Santhanam & Hartono 2003; Bhatt & Grover 2005; Mithas et al. 2012).

However, IT resources, as a large portion of financial investment, in contemporary business settings, are increasingly being owned and shared among multiple parties and IT value is thus often realized through multiple-parties cocreation (Grover & Kohli 2012; Kohli & Grover 2008). Such new trend in business settings, calls for researchers' attention to better understand multiple parties cocreating IT value (Kohli & Grover 2008). To answer the call, the proposed research, herein, discusses issues related to IT value cocreation. In particular, it emphasizes situations in which multiple firms with a coopetition – the coexistence of cooperation and competition – relationship partake in IT value cocreation activities.

Though conceiving IT value cocreation firms only having cooperation relationships is analytically convenient (as is assumed in most previous studies), this presumption is limited and often unrealistic. In real-world settings, competition relationships, knowingly or unknowingly, frequently exist among collaborating parties; and, emerging forms of such coopetition relationships are constantly reported (Ali 2013). Consider the case of Apple Inc. and Samsung Electronics Co. Ltd. (Gupta et al. 2013). Apple and Samsung leveraged IT business value through cocreating iPhone devices, with Samsung being a major supplier, where both parties benefit. However, Samsung later started to compete against Apple in smartphone market through resembling iPhone devices. The direct competition between Apple and Samsung clearly has influence on their IT value cocreation activities; evident in that Apple transferred partial supply chains from Samsung to other manufacturers.

Given ubiquitous coopetition relationships in IT value cocreation activities, isolating cooperation but dismissing competition results in an incomplete view. A potential consequence of the ignorance of competition is mixed research finding. Therefore, explicit consideration of both cooperation and competition relationships is of paramount importance, as competition can dramatically influence a firm's strategic choices regarding IT value cocreation activities.

In light of the motivation, this paper proposes a simulation modeling approach to investigating, how coopetition relationships in a firm's strategic alliances might affect (i) its strategic decisions about IT value cocreation as well as (ii) its intra-industrial performance. In particular, a high-level conceptual framework explicating and positioning a general process of multiple firms cocreating IT value, is offered. This framework affords a basis for formulating a formal, mathematical representation of IT value cocreation; thereby enabling a simulation modeling approach, specially, agent-based modeling, to investigating relevant questions.

The suggested research is amongst the earliest attempts towards understanding IT value cocreation. It is anticipated the research will offer a useful contribution to the field, through revealing analytical insights regarding how the coexistence of competition and collaboration might affect IT value cocreation processes. Instead of assuming a collaboration relationship in IT value cocreation, future research may be informed to be better attuned to coopetition relationships in strategic alliances. Further, the research may also provide useful implications for senior managers in assisting decision-making related to IT value cocreation activities.

The remainder of this paper is organized as follows. The following section reviews relevant literature. A high-level framework overviewing key processes of IT value cocreation is illustrated. A relational network view for understanding the interaction of cooperation and competition relationship is proposed. An agent-based modeling approach is designed.

2 THE LITERATURE

The information technology (IT) business value research¹ varies and is formed by differing streams of research, with thousands of studies published in the field (e.g., Rai et al. 1997; Hitt et al. 2002; Davern & Kauffman 2000; Gable et al. 2008; Kohli & Devaraj 2003). Given the challenge to measure various often-intangible derivative value from the IT (e.g., economic, social, individual, etc.), much previous IT value research focuses on measuring or quantifying the business value of IT (e.g., DeLone & McLean 1992; 2003).

Further, with differing interest to better leverage IT value, many researchers seek to identify potential mediating factors completing the causal paths from IT to its derived value (Sambamurthy et al. 2003; Rai & Tang 2010; Santhanam & Hartono 2003; Bhatt & Grover 2005; Mithas et al. 2012). Recently, most these studies, knowingly or unknowingly, implicitly or explicitly, employ Resource-Based View (RBV) of firms (Barney 1991) as a theoretical view to explain the creation of IT value. According to RBV, firms, with IT resources that are rare, valuable, inimitable, non-substitutable, and imperfectly mobile, have potential to transform IT resources into IT capabilities and subsequently enable improved business capabilities with the IT capabilities. The improved business capabilities contribute to and sustain firms' long-term competitive advantage (Melville et al. 2004; Wade & Hulland 2004; Bharadwaj et al. 1999).

Previous research, though useful in a single firm's perspective, is limited in understanding IT value cocreation by multiple firms (Grover & Kohli 2012; Ceccagnoli et al. 2012; Han et al. 2012; Rai et al. 2012; Sarker et al. 2012). Recent studies (e.g., Ceccagnoli et al. 2012; Han et al. 2012; Rai et al. 2012; Sarker et al. 2012) identified several related issues. For instance, sources of inter-firm IT capabilities as well as business processes enabling cocreating IT value with these capabilities, remain largely unknown (Rai et al. 2012). Further, understanding of underlying mechanisms fostering knowledge (i.e., the IT value) cocreation through an open innovation platform (i.e., the IT), is limited (Han et al. 2012).

To facilitate better understanding of the context where IT value is being cocreated, it is necessary for researchers to concentrate on the new research initiative of IT value cocreation (Kohli & Grover 2008; Grover & Kohli 2012). The research initiative is well framed by Kohli & Grover (2008, p. 28) as, "IT value is increasingly being created and realized through actions of multiple parties [...where] value emanates from robust collaborative relationships among firms [...and] structures and incentives for parties to partake in and equitably share emergent value are necessary to sustain cocreation."

Constrained by the limitation of a single firm's perspective, RBV is less useful; instead, IT value cocreation is better explained by an extended version of RBV – Relational View of firms (Dyer & Singh 1998; Lavie 2006). Relational View suggests a firm may partially own IT resources that are shared with its alliance firms. The focal firm and its alliance firms can cocreate competitive advantage through jointly exploiting shared IT resources (e.g., IT expertise and infrastructure). Since the derived value originates from firms' strategic relationships with others, the cocreated IT value is denoted as the relational value. Common IT resources enabling and sustaining the relational value, include, relationship-specific assets, knowledge-sharing routines, complementary resources and capabilities, and effective governance of relationships (Dyer & Hatch 2006; Dyer & Singh 1998; Lavie 2006).

The suggested research, herein, analyzes IT value cocreation, consistent with the theoretical basis of Relational View (Dyer & Singh 1998; Lavie 2006). A firm's coopetition relationships with other firms translate to the firm's strategic alliance network (Gulati 2000; 1998). As such, the research seeks to probe the influence of firms' strategic alliances on IT value cocreation (Gulati 2000; 1998; Lavie 2006). Discussion in the following sections thus equates IT value with cocreated relational value without further illustration.

¹ In this paper, the IT business value, or IT value, is conceived as an "umbrella" concept, subsuming similar concepts in the literature, such as "IS success", "IT/IS effectiveness", "IT impact", etc.

3 IT VALUE COCREATION FRAMEWORK

To understand the dynamic interplay between cooperation and competition in IT value cocreation, a high-level conceptual framework overviewing key processes of IT value cocreation is suggested. A relational network perspective conceptualizing cooperation and competition relationships is proposed.

Prior to extending to IT value cocreation context, a fundamental question needs to be first addressed – how is business value created from IT investment within an organization? RBV, though implicitly, offers a process view of IT value creation; namely, firms possessing IT resources that are rare, valuable, inimitable, non-substitutable, and imperfectly mobile, can create and sustain competitive advantage by transforming IT resources into IT capabilities (Barney 1991). For example, the process, for information systems with primary functions of information processing, could be more explicitly specified as the following: IT or IT resources are the drivers for developing information capabilities, which in turn create business value through improving business capabilities such as faster customer response or increased tractability of products (Kohli & Grover 2008).

An additional account of collaboration is required, when extending value creation activities to involve multiple parties. Consistent with Relational View and RBV, Figure 1 illustrates a general process of multiple-firm IT value cocreation. Firms with strategic alliances co-develop IT capabilities through jointly investing in often complementary IT resources and share IT value generated from the IT capabilities (Grover & Kohli 2012).

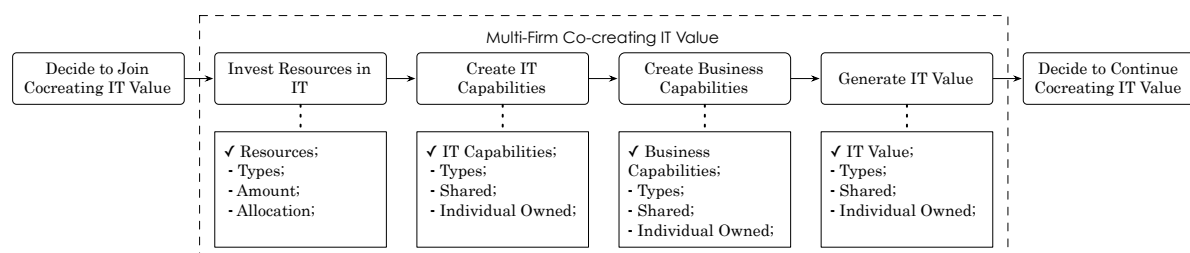


Figure 1. *IT Value Cocreation Framework: A General Process of IT Value Cocreation*

Note that, in the depicted process, including the phases of strategic alliances (i) formation and (ii) dissolution or continuation is useful. The inclusion extends the static, snapshot analysis to a dynamic, long-term perspective more compatible with “long-term sustained competitive advantage” presumption of RBV and Relational View. Further, the included phases may have significant influence on the IT value cocreation activities. For example, key decisions regarding the distribution of resources among firms need to be settled before commencing IT value cocreation activities, and the decisions are important determinants to whether or not firms are willing to continue collaboration relationships.

To further elaborate, consider the two phases analogous to general decision-making processes. A decision-making process often includes three stages: variation, selection, and retention (Zott 2003).

Variation stage identifies alternative solutions to join or continue cocreating IT value. Two factors are most relevant in identifying alternatives: the relational network and the internal IT value model. A relational network describes a focal firm’s relationships (i.e., competition and cooperation) with its strategic alliance firms. The relational network is strategically important; as solid cooperation relationships are likely to contribute to more relational value (Dyer & Singh 1998; Lavie 2006), whereas severe competition relationships are likely to lead to potential value loss. The relational network is thus necessary to be accounted for in alternative solutions, in order to better leverage benefits from firms’ strategic decisions. Further, an internal IT value model specifies a firm’s IT value cocreation function. In other words, the model describes how and to what extent a firm might perceive or sense potential cocreated IT value per IT investment. The value model often differs from firm to firm and is a main component of alternative solutions.

Selection stage evaluates identified alternatives and determines preferred alternatives. Firms select optimal alternatives based on cost and benefit of alternatives and decides the strategy of cocreating IT value and the negotiation strategy. The strategy for IT value cocreation specifies a firm' optimal decision structure of joining, continuing, or terminating IT value cocreation, regarding present and potential strategic alliance firms. Whereas, the negotiation strategy specifies an optimal decision structure for negotiating with strategic alliance firms in order to maximize potential benefits.

Retention stage executes selected alternatives. Implementing certain alternatives is not always feasible given organizational uncertainties. A common uncertainty is the organizational inertia, the structural forces preventing firms from certain change (Hannan & Freeman 1984). Accordingly, the likelihood of implementing selected strategies is "re-evaluated" (by external forces beyond firms' control).

Figure 2 summarizes the above described stages, integrated with the IT value cocreation processes. The entire process occurs within a time period t , such as one month, one quarter, or one year, and repeats itself in a continuum. In sum, the decision to join or continue cocreating IT value is first made within each firm; multiple firms then participate in negotiation and, if agreement is achieved in negotiation, cocreate IT value, otherwise terminate IT value cocreation.

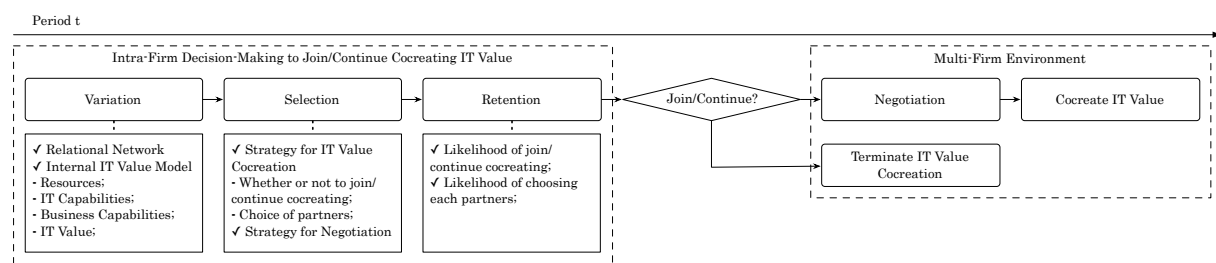


Figure 2. *IT Value Cocreation Framework: Intra-Firm Strategic Decision Making*

The consideration of the relational network enables a dynamic analysis of coopetition relationships. In a relational network, nodes are representative of firms involved in present or potential IT value cocreation. A link connecting nodes indicates the extent to which the cooperation and/or competition relationship between any two nodes (i.e., firms) is. The following further illustrates how the relational network is useful in considering various situations of coopetition relationships.

To assist the analysis, this paper offers a typology of relational network, as depicted in Figure 3. Each type of relational network is practically useful to characterize one common scenario of competition and/or cooperation relationships among firms within an industry. The typology summarizes the five most common types, with each type denoted as a "Baseline Model". The following illustrates each baseline model.

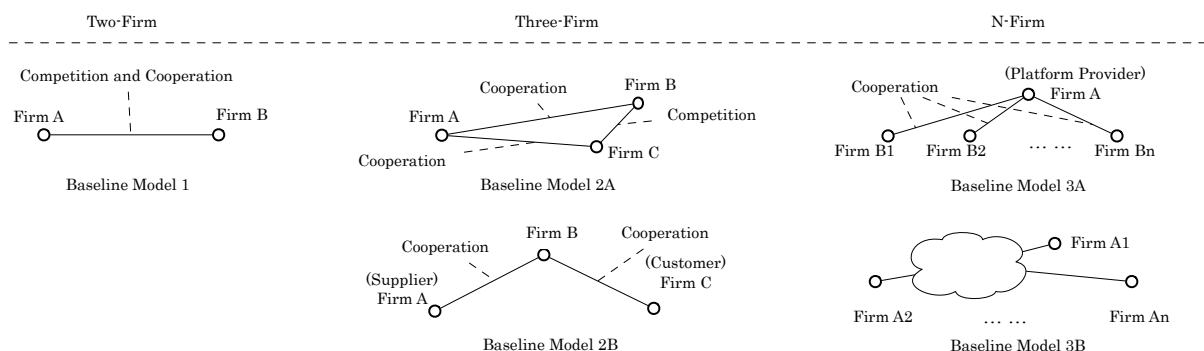


Figure 3. *Illustration of Cooperation Relationship: A Typology of Relational Network*

Baseline Model 1 – The simplest situation is there are only two firms involved in IT value cocreation, denoted as Baseline Model 1. In this situation, two properties characterizing the relationship between two firms (i.e., the degree of competition and the degree of cooperation) are most relevant. A combination of specific values of the two properties is descriptive of many real-world scenarios. At a

minimal level of competition, the network reduces to a scenario of two firms cooperating without competition; for example, a manufacturer cocreating IT value with a supplier, through co-investing an order-processing system to better coordinate needs and supplies for both parties and thereby to reduce in-stock costs. With the increment of the degree of competition, the cooperation relationship becomes increasingly difficult to form; as a result, potentially threatening IT value cocreation. For instance, the supplier may terminate cooperation when sensing the manufacturer being a strong competitor, such as when the manufacturer at the same time producing substitutable products of the supplier (e.g., consider the Apple and Samsung case).

Baseline Model 2A – When IT value cocreation involves three parties, two common situations are considered. As Baseline Model 2A in Figure 3, a firm *A* may cooperate with both firm *B* and firm *C*, with firm *B* and firm *C* being competitors to each other. This is common as a firm often has more than one suppliers. The competition relationship between firm *B* and firm *C* may create competitive advantage for firm *A* to better negotiate IT value cocreation partner firm. Thus, both the cooperation relationships (i.e., *A-B*, *A-C*) and competition relationships (i.e., *B-C*) are anticipated to affect IT value cocreation.

Baseline Model 2B – Another situation for three parties, denoted as Baseline Model 2B, is that a firm *B* cooperate with, for example, a supplier firm *A* and a customer firm *C*, whereas firm *A* and firm *C* do not have a competition relationship. In such a situation, firm *B* may cocreate IT value with both firm *A* and firm *C*, to maximize synergistic value from better relationship governance.

Baseline Model 3A – When more than two firms are involved in IT value cocreation, two common cases are identified. The first is a one-to-many cooperative relationship, denoted as Baseline Model 3A. In this model, a (e.g., platform provider) firm *A* cooperates with numerous partner firms, with present or potential competitive and cooperative relationships existing among partner firms. Consider the Apple Store (a mobile application sale platform owned by Apple Inc.) for example. Apple Inc. established cooperation relationships with thousands of mobile application contributor firms, through cocreating the Apple Store platform (i.e., the IT). Given the potential competition relationships among the platform contributor firms, Apple Inc., as the policy maker, needs to ensure peaceful coexistence of all platform contributors without jeopardizing its cooperation relationships with them.

Baseline Model 3B – A perhaps more general scenario than the above one is that no clear patterned relationships among firms can be identified, denoted as Baseline Model 3B. This means complex cooperation and/or competition relationships may exist among many firms. The relationships are too complex to reduce simple analyzable patterns.

The above described five baseline models amplify common characteristic scenarios of competition and/or cooperation relationships among IT value cocreation firms. Though real situations could potentially be more complicated than summarized here, the typology provides a basis for researchers to think about real situations and to compare and contrast these situations to one another. Note that the typology, though intended to be useful as far as possible, is not purported to be inclusive and comprehensive; rather, it is in progress.

4 TOWARDS AN AGENT-BASED MODELING APPROACH

The proposed research implements the suggested conceptual framework with a simulation modeling approach. Given known or unknown methodological limitation and biases in other approaches (e.g., case studies or survey research), application of a simulation approach has the potential to complement previous studies through revealing analytical blind spots (Burton & Obel 2011; Carley 1996; Davis et al. 2007). In particular, simulation methods are well positioned to answer the *what-might-be* questions often unexplored in previous studies (e.g., what might happen, if market competition evolves to the form of chaotic and random, as Baseline Model 3B in Figure 3) (Burton & Obel 2011).

The agent-based modeling approach (see Bonabeau 2002 for an overview), as a specific technique of simulation methods, is adopted, given its strengths of capturing emergent phenomena in complex systems, providing natural and intuitive description of phenomena, and flexibly controlling variables in computational experiments (Bonabeau 2002).

Table 1 summarizes a research design applying agent-based modeling approach. The design is appropriated based on several sources of remedies from the simulation modeling literature (Burton & Obel 2011; Carley 1996; Davis et al. 2007). The core of the design is consistent with the roadmap for developing theories using simulation methods (Davis et al. 2007). Procedures for validating a computational model are included (Carley 1996). Other minor extension includes contextualizing recommendations for the research purpose. Note that the suggested research process is evolutionary, with several places potentially incurring repetition of previous steps.

Step 1: Create Computational Representation
Operationalize Theoretical Constructs (Output: Computational Representation).
Build Computational Algorithm Mirroring Theoretical Logic (Output: Algorithms Reflecting Computational Logic).
Specify Assumptions (Output: List of Assumptions).
Ensure Computational Representation Allows Theoretically Valuable Experimentation (Otherwise, Iterate Prior Steps).
Step 2: Verify Computational Representation
Replicate Propositions of the Conceptual Model with Simulation Results (Output: Verification Results).
Conduct Robustness Checks of Computational Representation (Output: Robustness Check Results).
If Verification Fails, Correct Theory and/or Software Coding (Iteration of Prior Steps and Activities).
Step 3: Experiment to Build Novel Theory
Create Experimental Design (Output: Experimental Design).
Experiment (Output: Generated Data).
Analyze Data (Iteration of Prior Steps and Activities).
Step 4: Validate with Empirical Data
Compare Simulation Results with Empirical Data (Output: Validation Results).

Table 1. Simulation Modeling Approach to IT Value Cocreation

Step 1: Create Computational Representation – Theoretical concepts in a conceptual model are required to be “translated” into a computational representation (e.g., a set of variables and equations) (Davis et al. 2007). Such a process is analogous to the operationalization of theoretical concepts into measurement items when using a survey research method. Specifically in the language of agent-based modeling, firms, for example, could be modelled as agents, whereas other related within- and/or between- firm interacting processes could be codified as behavioral rules of agents. Operationalization establishes a mapping between a conceptual model and an agent-based modelling representation.

The computational representation is next codified with specific programming languages and built into computer algorithms consistent with the theoretical logic (Davis et al. 2007). Further, assumptions in the computational representation are required to be explicitly and precisely specified, as the assumptions constrain ways of simulation results can be interpreted. To ensure the computational representation permit studying the intended research questions, checking whether or not key variables and processes are modelled is essential. Passing the check insures feasibility of simulation experiments. Otherwise, it is necessary to revisit earlier procedures and to refine the computational representation.

Step 2: Verify Computational Representation – The computational representation needs to be verified for internal validity – it accurately embodied the theoretical logic of the conceptual model. The verification ensures simulation results can be interpreted with confidence (Carley 1996; Davis et al. 2007).

One common verification approach is to compare simulation results with the theoretical propositions of the conceptual model (Carley 1996). The rationale of this approach is that, if generative data output from simulation conforms to the propositions stated in the conceptual model, the internal processes of the computational representation are more likely to be valid in reflecting the conceptual model.

An alternative is to examine robustness of the computational representation (also, sensitivity analysis) (Davis et al. 2007). A robust model is not sensitive to changes in initial conditions. In other words, minor changes of initial conditions should not result in dramatic disturbances of the simulation results, unless it is theoretically predicted to be so (e.g., passing certain threshold levels).

If verification fails, it is required to repeat earlier steps and to refine the computational representation (Davis et al. 2007). Perhaps, at most times, verification failure indicates certain issues or errors of the computational representation, for example, issues of algorithmic logic and errors of computer code. Occasionally, it is not indicative of low robustness, but of potential areas (e.g., observing unexpected values) not adequately explained by the conceptual model² (Davis et al. 2007).

Step 3: Experiment to Build Novel Theory – The research questions are investigated through conducting computational experimentation (Burton & Obel 2011; Davis et al. 2007). Given the evolutionary nature of simulation research, the experimental design is anticipated to be continuously refined and adjusted according to the experiment observation. The previously suggested typology of relational network offers a source of experiments. Consider Table 2 for example.

Situation	Baseline Model	Variation of Value
Two-Firm	Baseline Model 1	Competition: {0-1}; Cooperation: {0-1};
Three-Firm	Baseline Model 2A	Cooperation [A-B]: {0-1}; Cooperation [A-C]: {0-1}; Competition [B-C]: {0-1};
	Baseline Model 2B	Cooperation [A-B]: {0-1}; Cooperation [B-C]: {0-1};
N-Firm	Baseline Model 3A	Cooperation [A-B _i]: {0-1};
	Baseline Model 3B	Cooperation [A _i -A _j]: {0-1}; Competition [A _i -A _j]: {0-1};

Table 2. *Illustration of Experimental Design: Variation on Relational Network*

Step 4: Validate with Empirical Data – The computational representation needs to be validated for external validity³ (Burton & Obel 2011; Carley 1996; Davis et al. 2007). Validation often employs two sets of techniques – grounding and verification with empirical data. Grounding includes specific techniques such as story telling, initialization, and simple evaluation of patterns (Carley 1996). It often evaluates the face validity, the parameter validity, and the process validity; where the logic is to justify, for example, the model parameters and/or internal processes are representative of real-world situations (Carley 1996). Whereas, verification with empirical data, graphically and/or statistically, compares the artificial data generated by the computational model against the collected empirical data (Davis et al. 2007). The verification validates the pattern validity of the computational representation – the patterns of the generated artificial data are similar to the patterns of empirical data (Carley 1996).

5 FUTURE RESEARCH

The current research is in the midst of specifying the mathematical model. Future research will follow the suggested research agenda, as summarized in Table 1.

² This is because verification can only confirm the internal validity of the computational representation. Mismatch between the hypotheses from a conceptual model and the generative data from a computational representation may be a result of that the conceptual model is not internally coherent.

³ Some researchers recommend the computational representation should be validated prior to simulation experimentation (e.g., Zott 2003). Given almost unlimited potential aspects of a computational model could be empirically validated (Carley 1996), the level of validation required often depends on the goal of the model (Burton & Obel 2011) and the collection of empirical data depends on which aspects of the model are experimented. Therefore, it may be more reasonable to conduct simulation experimentation prior to empirical validation (Davis et al. 2007).

References

- Ali, A. (2013). Cooperative Antagonism in the Marketplace. *International Journal of Commerce and Management*, 23(2), 1–1.
- Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, 17(1), 99–120.
- Bharadwaj, A. S., Sambamurthy, V., and Zmud, R. W. (1999). IT Capabilities: Theoretical Perspectives and Empirical Operationalization. In *Proceedings of the 20th International Conference on Information Systems*, Atlanta, GA, USA, 378–385.
- Bhatt, G. D., and Grover, V. (2005). Types of Information Technology Capabilities and Their Role in Competitive Advantage: an Empirical Study. *Journal of Management Information Systems*, 22(2), 253–277.
- Bonabeau, E. (2002). Agent-Based Modeling: Methods and Techniques for Simulating Human Systems. In *Proceedings of the National Academy of Sciences of the United States of America*, 99(Suppl 3), 7280–7287.
- Burton, R. M., and Obel, B. (2011). Computational Modeling for What-Is, What-Might-Be, and What-Should-Be Studies—and Triangulation. *Organization Science*, 22(5), 1195–1202.
- Carley, K. M. (1996). Validating Computational Models, Paper available at www.casos.cs.cmu.edu/publications/papers.php.
- Ceccagnoli, M., Forman, C., Huang, P., and Wu, D. J. (2012). Cocreation of Value in a Platform Ecosystem: the Case of Enterprise Software, *MIS Quarterly*, 36(1), 263–290.
- Davern, M. J., and Kauffman, R. J. (2000). Discovering Potential and Realizing Value From Information Technology Investments, *Journal of Management Information Systems*, 16(4), 121–143.
- Davis, J. P., Eisenhardt, K. M., and Bingham, C. B. (2007). Developing Theory Through Simulation Methods. *Academy of Management Review*, 32(2), 480–499.
- DeLone, W. H., and McLean, E. R. (1992). Information Systems Success: the Quest for the Dependent Variable. *Information Systems Research*, 3(1), 60–95.
- DeLone, W. H., and McLean, E. R. (2003). The DeLone and McLean Model of Information Systems Success: a Ten-Year Update. *Journal of Management Information Systems*, 19(4), 9–30.
- Dyer, J. H., and Hatch, N. W. (2006). Relation-Specific Capabilities and Barriers to Knowledge Transfers: Creating Advantage Through Network Relationships. *Strategic Management Journal*, 27(8), 701–719.
- Dyer, J. H., and Singh, H. (1998). The Relational View: Cooperative Strategy and Sources of Interorganizational Competitive Advantage. *Academy of Management Review*, 23(4), 660–679.
- Gable, G. G., Sedera, D., and Chan, T. (2008). Re-Conceptualizing Information System Success: the IS-Impact Measurement Model. *Journal of the Association for Information Systems*, 9(7), 377–408.
- Grover, V., and Kohli, R. (2012). Cocreating IT Value: New Capabilities and Metrics for Multifirm Environments. *MIS Quarterly*, 36(1), 225–232.
- Gulati, R. (1998). Alliances and Networks. *Strategic Management Journal*, 19(4), 293–317.
- Gulati, R., Nohria, N., and Zaheer, A. (2000). Strategic Networks. *Strategic Management Journal*, 21(3), 203–215.
- Gupta, P., Kim, M., and Levine, D. (2013). RPT-INSIGHT-Apple and Samsung, Frenemies for Life. Available at: www.reuters.com/article/2013/02/11/apple-samsung-idUSL1N0BA0AL20130211, accessed March 5, 2014.
- Han, K., Oh, W., Im, K. S., Chang, R. M., Oh, H., and Pinsonneault, A. (2012). Value Cocreation and Wealth Spillover in Open Innovation Alliances. *MIS Quarterly*, 36(1), 291–315.
- Hannan, M. T., and Freeman, J. (1984). Structural Inertia and Organizational Change. *American Sociological Review*, 49(2), 149–164.
- Hitt, L. M., Wu, D. J., and Zhou, X. (2002). Investment in Enterprise Resource Planning: Business Impact and Productivity Measures. *Journal of Management Information Systems*, 19(1), 71–98.
- Kohli, R., and Devaraj, S. (2003). Measuring Information Technology Payoff: a Meta-Analysis of Structural Variables in Firm-Level Empirical Research. *Information Systems Research*, 14(2), 127–145.
- Kohli, R., and Grover, V. (2008). Business Value of IT: an Essay on Expanding Research Directions

- to Keep Up with the Times, *Journal of the Association for Information Systems*, 9(1), 23–39.
- Lavie, D. (2006). The Competitive Advantage of Interconnected Firms: an Extension of the Resource-Based View. *Academy of Management Review*, 31(3), 638–658.
- Melville, N., Kraemer, K., and Gurbaxani, V. (2004). Information Technology and Organizational Performance: an Integrative Model of IT Business Value. *MIS Quarterly*, 28(2), 283–322.
- Mithas, S., Tafti, A., Bardhan, I., and Mein Goh, J. (2012). Information Technology and Firm Profitability: Mechanisms and Empirical Evidence. *MIS Quarterly*, 36(1), 205–224.
- Rai, A., and Tang, X. (2010). Leveraging IT Capabilities and Competitive Process Capabilities for the Management of Interorganizational Relationship Portfolios. *Information Systems Research*, 21(3), 516–542.
- Rai, A., Patnayakuni, R., and Patnayakuni, N. (1997). Technology Investment and Business Performance. *Communications of the ACM*, 40(7), 89–97.
- Rai, A., Pavlou, P. A., Im, G., and Du, S. (2012). Interfirm IT Capability Profiles and Communications for Cocreating Relational Value: Evidence From the Logistics Industry. *MIS Quarterly*, 36(1), 233–262.
- Sambamurthy, V., Bharadwaj, A., and Grover, V. (2003). Shaping Agility Through Digital Options: Reconceptualizing the Role of Information Technology in Contemporary Firms. *MIS Quarterly*, 27(2), 237–263.
- Santhanam, R., and Hartono, E. (2003). Issues in Linking Information Technology Capability to Firm Performance. *MIS Quarterly*, 27(1), 125–153.
- Sarker, S., Sarker, S., Sahaym, A., and Bjørn-Andersen, N. (2012). Exploring Value Cocreation in Relationships Between an ERP Vendor and Its Partners: a Revelatory Case Study. *MIS Quarterly*, 36(1), 317–338.
- Wade, M., and Hulland, J. (2004). The Resource-Based View and Information Systems Research: Review, Extension, and Suggestions for Future Research. *MIS Quarterly*, 28(1), 107–142.
- Zott, C. (2003). Dynamic Capabilities and the Emergence of Intraindustry Differential Firm Performance: Insights From a Simulation Study. *Strategic Management Journal*, 24(2), 97–125.